AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions of claims in the application.

1. (Currently amended): [[A]] A semiconductor optical element formed on a group III-nitride semiconductor substrate comprising:

a ZrB_2 single crystal base having a defect density of 10^7 cm^{-2} or less;

a low-temperature buffer layer consisting of a $B_xAl_yGa_zIn_{1-x-y-z}N$ ($0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq 1-x-y-z \leq 1$) single crystal which is grown or deposited on said ZrB_2 single crystal base substantially without creation of any Zr – B – N amorphous nitrided layer caused by the reaction between a nitrogen atom and said ZrB_2 single crystal base wherein said low-temperature buffer layer has a thickness in the range of 10 nm to 1 μm; and

a semiconductor layer consisting of a $B_aAl_bGa_cIn_{1-a-b-c}N$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq c \leq 1$, $0 \leq 1-a-b-c \leq 1$) single crystal grown on said low-temperature buffer layer, said semiconductor layer having an element-forming surface with a dislocation density of 10^7 cm^{-2} or less in its ~~entirely~~ entirety.

2. (Cancelled).

3. (Currently amended): The semiconductor optical element as defined in claim [[2]] 1, which includes an electrode formed on the side of said base.

4. (Currently amended): A method of producing a group III-nitride semiconductor substrate, essentially consisting of:

a first step of forming a low-temperature buffer layer consisting of $B_xAl_yGa_zIn_{1-x-y-z}N$ ($0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq 1-x-y-z \leq 1$), on a ZrB_2 single crystal base having a defect density of 10^7 cm^{-2} or less, at a base temperature allowing said low-temperature buffer layer to be grown or deposited on said ZrB_2 single crystal base substantially without creation of any Zr – B – N amorphous nitrided layer, wherein said low-temperature buffer layer has a thickness in the range of 10 nm to 1 μm, and said low-temperature buffer layer is formed as a single crystal at the time said first step is completed; and

a second step of successively to said first step, growing a single crystal film consisting of $B_aAl_bGa_cIn_{1-a-b-c}N$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq c \leq 1$, $0 \leq 1-a-b-c \leq 1$), directly on said low-temperature buffer layer, to form a semiconductor layer consisting of $Al_aGa_{1-a-b}In_bN$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq 1-a-b \leq 1$) which has an element-forming surface with a dislocation density of 10^7 cm^{-2} or less in its ~~entirely~~ entirety.

5. (Cancelled)

6. (Original): ~~The method as defined in claim 4~~ A method of producing a group III-nitride semiconductor substrate, essentially consisting of:

a first step of forming a low-temperature buffer layer consisting of $B_xAl_yGa_zIn_{1-x-y-z}N$ ($0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq 1-x-y-z \leq 1$) wherein said low-temperature buffer layer has a thickness in the range of 10 nm to 1 μm, on a ZrB_2 single crystal base having a defect density of 10^7 cm^{-2} or less, at a base temperature allowing said low-temperature buffer layer to be grown or deposited on said ZrB_2 single crystal base substantially without creation of any Zr – B – N amorphous nitrided layer, wherein said low-temperature buffer layer has a thickness in the range of 10 nm to 1 μm; and

a second step of successively to said first step, growing a single crystal film consisting of $B_aAl_bGa_cIn_{1-a-b-c}N$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq c \leq 1$, $0 \leq 1-a-b-c \leq 1$), directly on said low-temperature buffer layer, to form a semiconductor layer consisting of $Al_aGa_{1-a-b}In_bN$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq 1-a-b \leq 1$) which has an element-forming surface with a dislocation density of 10^7 cm^{-2} or less in its entirety, wherein said low-temperature buffer layer is polycrystalline or amorphous at the time said first step is completed, and formed as a single-crystal at the time said second step is completed.

7. (Cancelled).